

# **EXHIBIT 23**

## **Expert Report of Paul Oyer**

**IN THE UNITED STATES DISTRICT COURT FOR THE  
DISTRICT OF NEVADA**

Cung Le, et al. v. Zuffa, LLC

**EXPERT REPORT OF PAUL OYER**

**October 27, 2017**

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**I. Qualifications**

1. I am the Fred H. Merrill Professor of Economics at Stanford University's Graduate School of Business (GSB) in Stanford, California. I have been on the Stanford faculty for seventeen years. I am a Research Associate at the National Bureau of Economic Research, a position to which I was elected by my peers.<sup>1</sup> I am the Editor-in-Chief of *The Journal of Labor Economics*, the leading scholarly journal in the area of labor economics.

2. Prior to working at Stanford, I was a member of the faculty of the Kellogg School of Management at Northwestern University in Evanston, Illinois. I hold a PhD and an MA in Economics from Princeton University, an MBA from Yale University, and a BA in Mathematics and Computer Science from Middlebury College.

3. My full academic Curriculum Vitae is attached as Exhibit A.

4. I am an expert in labor economics and often do research that addresses issues in both labor economics and financial economics. I have been engaged in academic research in these areas for over twenty-five years. My research focus and expertise includes the labor market for highly talented workers with scarce and valuable skills.

**II. Assignment**

5. I have been asked by counsel for Zuffa, LLC to (1) explain the common and economically-accepted methods of evaluating compensation particularly as it relates to allegedly monopsonized markets, and (2) assess whether Dr. Hal Singer and Professor Andrew Zimbalist's use of fighter pay as a percentage of revenue is consistent with accepted labor economics and supportive of their conclusions.

6. The hourly rate for my work on this engagement is \$950, which is my usual rate for consulting.

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<sup>1</sup> The NBER describes itself as follows: "The NBER is the nation's leading nonprofit economic research organization. Twenty-seven Nobel Prize winners in Economics and thirteen past chairs of the President's Council of Economic Advisers have held NBER affiliations. The more than 1,400 professors of economics and business now teaching at colleges and universities in North America who are NBER researchers are the leading scholars in their fields." <http://www.nber.org/info.html>, accessed October 17, 2017.

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### III. Background

7. I have reviewed the expert reports submitted by Dr. Hal Singer and Professor Andrew Zimbalist in this case and the transcripts of their deposition testimony.

8. In particular, I focused on the portions of their reports or their deposition testimony that related to what I will describe as “labor share” or the percentage of a firm’s total revenues paid out as workers’ compensation.

9. Both Dr. Singer and Professor Zimbalist use labor share as the basis for their analyses. In his expert report in this matter, Dr. Singer estimates damages to MMA athletes attributable to the alleged anticompetitive behavior of Zuffa. The critical analysis underlying all his damage estimates are the regressions reported in Table 6 of his report. Dr. Singer explains that, “The dependent variable in my regression model (‘Fighter Share’) is equal to the share of Zuffa’s event-specific revenue (‘Event Revenue’) paid to a given Fighter that participated in a given event at a given point in time. Zuffa’s Event Revenues include revenues from ticket sales, PPV and broadcasting fees, and other event-specific revenue streams.”<sup>2</sup> Dr. Singer refers to this dependent variable as “fighter share” throughout his report. In Dr. Singer’s deposition, workers’ share of total firm revenue is referred to more generally as “labor share” and “wage share” so as to include contexts beyond MMA.

10. Professor Zimbalist provides an expert report in which all of his estimates of damages are based on the share of revenue earned by UFC fighters relative to athletes in other sports.

11. I evaluated the ways in which Dr. Singer and Professor Zimbalist used labor share to see if it is consistent with industry-accepted practices in labor economics. I also assessed whether it was supportive of their conclusions regarding impact and damages.

### IV. Summary of Opinion

12. Labor share is not accepted in the economics community as the proper basis to evaluate compensation and it is not used in benchmarking competitive markets. Economists doing empirical analysis of earnings typically look at the *level* of pay (and, specifically, the natural logarithm of earnings) because it is a better proxy for the value the worker adds. Labor share is driven by overall firm revenues which includes many factors beyond the control of (and related to the value of) the worker.

13. Dr. Singer’s empirical analysis and his application of concepts in labor economics are fundamentally flawed. Dr. Singer did not use or even mention economic ideas and empirical methods that are typically used to study the relationship between a firm’s “monopsony” power and employee compensation. As a result, his estimates of damages are unreliable and provide no useful information about whether or not and to what degree Zuffa caused any financial damages to UFC athletes. When reanalyzing the data used by Dr. Singer in a way that is consistent with academic labor economics

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<sup>2</sup> Expert Report of Hal J. Singer, PH.D (“Singer Report”) at 118.

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studies, the empirical results provide no evidence that consolidation of the MMA market by UFC has lowered the compensation of MMA fighters.

14. Professor Zimbalist's expert report also focuses on a measure of employee compensation that is not recognized as an appropriate metric of whether earnings are in line with the market. He also compares MMA compensation to other sports that are fundamentally different, in terms of how athletes should be compensated, than MMA while ignoring other sports that might be more appropriate for comparison.

**V. Dr. Singer's Use of Labor Share is Inconsistent with Economic Principles and Empirical Studies in Labor Economics**

**A. Labor Share is Not an Economically Accepted Way to Evaluate Worker Compensation**

15. Labor economists do not use labor share as a way to evaluate worker compensation or to benchmark competition in competitive labor markets. Labor economists start from the basic principle that, in a competitive labor market, a firm will be willing to pay a worker up to the "marginal product" of that worker's labor. That is, the firm is willing to pay the worker the additional value that the employee creates.

16. Consider a common and simple example – a salesperson. A company will often pay a salesperson a share of his or her sales (a sales commission). The more the employee sells (that is, the higher his or her marginal product), the more the employee earns. The commission and the salesperson's salary will adjust for the costs of the product sold, the fixed costs (such as benefits and administrative costs), and other costs of employing the salesperson. The salesperson's pay is related to *his or her productivity* – his or her marginal product. It is not related to or based on the *firm's* overall revenues.

17. It is not as easy to see or estimate the marginal product of labor for most employees as it is for salespeople, but the same basic principle applies. Firms offer salaries and other compensation and they adjust them over time as the employee gains skills, proves more or less valuable than expected, and as other employers make offers. The determination of a worker's pay is driven by his or her output, not by his or her output relative to the size of the firm. Consequently, the level of the individual's pay, rather than pay as a share of firm revenues, is the relevant benchmark and is a natural proxy of the worker's marginal product of labor.

18. If the labor market is not competitive, as is alleged in this case, then earnings will not reflect a worker's marginal product of labor. That is, in a "monopsonistic" labor market where a firm has market power over its workers, the firm will pay its workers less than their marginal product of labor. However, the proper benchmark remains the marginal product of labor in a "but for" world where the firm has no monopsonistic power. As a result, economists will analyze the *level* of pay across workers with and without monopsony power and attribute differences in the level of pay to the difference in the ability of a monopsonistic and a competitive firm to withhold some of a worker's marginal product.

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19. The empirical analysis of pay done by labor economists has, for a long time, taken a certain form based on the level of earnings. Specifically, when labor economists study the determination of compensation in labor markets, in specific industries, and within individual firms, they typically run a “Mincer Regression.”<sup>3</sup> In these wage regressions, the dependent variable is the natural logarithm (“log”) of a worker’s compensation over some specific period of time such as a year, a week, or an hour. In rare cases, (similar to the context Dr. Singer studies) the dependent variable in a Mincer Regression will be log pay in a single event. A common variant of the basic Mincer Regression is to use the change in the natural log of compensation.

20. In my experience, virtually any research-related analysis of compensation done by qualified labor economists is focused around Mincer Regressions or some slight variant on them. A typical issue of a labor economics journal will have several papers that use Mincer Regressions as the core of the analysis.

21. Mincer regressions are the core tool of analysis of labor markets generally. But, of more relevance in this case, they are also the primary tool used in academic studies of “monopsony” and, more generally, of employers’ exertion of market power to lower employee compensation.

22. The economic literature on this is robust. Alan Manning, a labor economist at the London School of Economics, has written extensively on monopsony. In addition to his own research, he has written two detailed reviews of the literature on monopsony and employer labor market power. His 2003 book, *Monopsony in Motion*, reviews the underlying economics of monopsony and employer power and the academic literature in this area. In this book, Manning has numerous tables showing empirical results of research in this area conducted by himself or by other labor economics scholars. At least seven tables in this book present empirical analysis trying to determine if there is monopsony power in some labor market using log of wages (hourly, weekly, etc. and sometimes the change in log of wages from one period to another) as the dependent variable. However, there are *no* regressions or tables in the book that use labor share of revenue or labor share of any employer output measure as any part of the empirical analysis. In fact, there is no use of the term “labor share” (or any related term) in the entire book.

23. Manning also wrote a chapter in the *Handbook of Labor Economics* in 2011. This volume is a primary source for surveys of labor economic topics written by a panel of labor economists who are considered leaders in the field and experts on a particular topic. Manning reviewed a large number of relevant empirical studies. Those that study how monopsony power affects wages all use Mincer regressions where the dependent variable is the log of earnings or the change in the log of earnings.

24. Several of the studies that Manning reviews in his handbook chapter relate to nurses. Nursing is a profession that has long been suspected of having powerful

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<sup>3</sup> The name is based on the seminal work in this literature – Jacob Mincer 1974, *Schooling, Experience and Earnings*, Columbia University Press: New York.

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employers that can use this power to control wages, as Dr. Singer noted in his deposition. The academic studies of this profession all use the log of wages as the primary dependent variable when measuring the degree of monopsony. They look at the level of wages in areas where they suspect nurse employers have monopsony power. They compare these nurses' wages to benchmark workers that are either nurses in areas where employers do not have monopsony power or workers in industries and occupations where the labor market is considered more competitive. In both benchmark cases, pay is likely to be reflective of the worker's marginal product but there is no reason to think that these benchmark workers' pay as a share of their firm's revenues provides a meaningful comparison nor that it is a reasonable proxy for the workers' marginal products.

25. For example, economists Barry Hirsh and Edward Schumacher published two studies of monopsony power in nursing. In the first, they did "standard log wage equation"<sup>4</sup> regressions where the dependent variable is log of hourly wage. They then look for monopsony power by comparing log wages of nurses to log wages of other workers by area. In the later paper, they do more analyses, all of which focus on log of wage and how it relates to concentration of the nurse market.<sup>5</sup>

26. Manning also cites an influential study by Suresh Naidu that looks at laws in the post-bellum South that discouraged white employers from hiring black workers.<sup>6</sup> Naidu measures the effects of these laws using regressions where the dependent variable is the log of the average wage for the relevant workers by state by year (the finest level of detail available). Manning also mentions a study by Morris Kleiner and Won Park that looks at the pay of dental hygienists and how it relates to rules regarding dentists' ability to control them. They use the log of the hourly earnings of employees as the dependent variable in their analysis.<sup>7</sup>

27. In an earlier review of monopsony, William Boal and Michael Ransom discuss numerous papers. They highlight one study of teachers, noting "Beck's (1993) dissertation is the most comprehensive of the studies of monopsony in the school-teacher market. He analyzes pooled data from all 541 school districts in Missouri for several years between 1982 and 1990. He defines the market for each district to include all

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<sup>4</sup> Barry T. Hirsch and Edward J. Schumacher, 1995, "Monopsony Power and Relative Wages in the Labor Market for Nurses," *Journal of Health Economics*, 14, at 455.

<sup>5</sup> Barry T. Hirsch and Edward J. Schumacher, 2005, "Classic or New Monopsony? Searching for Evidence in Nursing Labor Markets," *Journal of Health Economics*, 24, 969-989.

<sup>6</sup> Suresh Naidu, 2010, "Recruitment Restrictions and Labor Markets: Evidence from the Post-Bellum US South", *Journal of Labor Economics*, 28, 413-445.

<sup>7</sup> Morris Kleiner and Kyoung Won Park, 2010, Battles Among Licensed Occupations: Analyzing Government Regulations on Labor Market Outcomes for Dentists and Hygienists, NBER Working Paper #16,560.



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districts located within a 25 mile radius. As a dependent variable, he uses the logarithm of the average teacher's salary in a district..."<sup>8</sup>

**B. Dr. Singer's Statements About the Use of Labor Share in Labor Economics Are Wrong**

28. There is no literature of which I am aware in the academic community that accepts use of labor share as a proper basis for measuring how monopsony power affects compensation. In fact, there is virtually no literature that uses labor share when studying the effect of *any* variable that might affect a worker's marginal product or pay.

29. When asked at deposition if he could cite specific academic or peer-reviewed studies that analyze wage share in general and for purposes of estimating damages in antitrust cases, Dr. Singer responded, "I think that the concept of -- of labor's share of his or her marginal revenue product is the foundation of labor economics. It's going to be something that is widely researched and studied in the abstract and in particular industries."<sup>9</sup> He later elaborated, "the wage share of marginal revenue product is the way that you understand competition in competitive labor markets and how you understand the opposite."<sup>10</sup>

30. In fact, the labor share as Dr. Singer measures it is not the foundation of labor economics, it is not widely researched by labor economists, and it has not been widely studied in particular industries by labor economists. When benchmarking competition in competitive labor markets, labor economists do *not* study the share of revenues that accrue to labor. Labor share is not generally accepted in the field of labor economics as a method for determining compensation in a competitive labor market and the validity and reliability of such a method for evaluating an anticompetitive effect has not been tested within the field.

31. Dr. Singer's confusion here could be due to the fact that there is a large literature among macroeconomists that studies labor's share of the economy. Typically, this involves looking at wages as a fraction of Gross Domestic Product, some other macroeconomic measure of the size or the health of the economy, or a measure of the size of an entire sector of the economy. These studies do not equate labor's share to the market power employers hold over labor.

32. For example, macroeconomists Loukas Karabarbounis and Brent Neiman recently published a widely read and cited study in which they analyze long-term global trends in the labor share of the economy as a whole and of very broadly defined industries (such as mining and construction).<sup>11</sup> They never mention issues related to

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<sup>8</sup> William M. Boal and Michael R. Ransom, 1997, "Monopsony in the Labor Market," *Journal of Economic Literature*, 35, at 103-104.

<sup>9</sup> Deposition of Hal J. Singer ("Singer Tr.") at 112:10-16.

<sup>10</sup> *Id.* at 114:14-18.

<sup>11</sup> Loukas Karabarbounis and Brent Neiman, 2014, "The Global Decline of the Labor Share," *The Quarterly Journal of Economics*, 129, 61-103.

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competitiveness in the labor market. They attribute the decline in the global labor share to changes in the price of investment goods and other factors unrelated to the labor market.

33. There is one recent paper (which is not currently published but has been circulated as a “working paper”) that studies the decline in labor share for individual firms and that was written by scholars who are widely recognized as leading labor economists.<sup>12</sup> This paper, by Autor, et al., shows that the labor shares of individual firms (that is, employee compensation costs as a fraction of total revenues) differ significantly within industries, that firms with lower labor shares tend to take over markets, and that lower labor shares and increasing market share are associated with innovation and increased globalization. The trends they look at are similar to the growth and expansion of UFC. Autor, et al. explain the decline in the global labor share as a natural phenomenon that is not related to unfair practices on the part of firms (though they mention this as a possible contributing factor).

34. Autor, et al. show that wages and the share of labor do *not* generally rise and fall together which invalidates the claims made by Dr. Singer and Professor Zimbalist that lower labor share is synonymous with lower or suppressed labor earnings. Specifically, Autor, et al. write, “Interestingly, the final row of Figure 14 shows that we do not find any correlation of concentration growth with average wage (payroll per hour) changes. This suggests that *concentrating sectors are not those where average wages are systematically falling, even though the share of labor is.*”<sup>13</sup>

**C. Dr. Singer’s Focus on “Fighter Share” Leads Him to Draw Inappropriate Conclusions**

35. By not following this standard procedure for analyzing the data, Dr. Singer ends up making inappropriate conclusions because he equates labor share with compensation.

36. In his report, Dr. Singer interprets his regressions as indicating what would have happened had Zuffa not had the “foreclosure” share (as he defines it) that it had. He states, “Therefore, both the Strikeforce pre-acquisition Fighter Shares and Zuffa Fighter Shares during periods of (relatively) low foreclosure effectively serve as benchmarks for the Fighter Shares that Zuffa Fighters would have received in the but-for world.”<sup>14</sup> This is not true as a matter of labor economics because there could be other factors that affect the denominator of Singer’s “fighter share” variable (that is, the revenues of an event) while not affecting the value added by the fighters. For example, suppose the mergers and/or other factors that led Zuffa to increase its share of fighters were the result of Zuffa having built the sport of MMA successfully and of Zuffa establishing a strong brand. As a result, fighters, as well as broadcasters and others that work in the MMA industry, would want

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<sup>12</sup> David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen, “The Fall of the Labor Share and the Rise of Superstar Firms,” working paper, May 1, 2017, downloaded from <https://economics.mit.edu/files/12979>.

<sup>13</sup> *Id.* at 23, emphasis added.

<sup>14</sup> Singer Report at 120.

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to work more with Zuffa than other MMA promoters. Having good fighters and other workers, as well as having built the sport successfully, would be the factor causing the increase in fight revenue. As a result, this would also spuriously decrease fighter share though the fighter's marginal product did not decrease. That is, fighter share is a combination of the marginal product of the fighter, the value added by Zuffa itself, and other potential market factors. The compensation measure used and accepted by labor economists in academic studies of monopsony power, on the other hand, focuses on the pay and proxies for the marginal product of *only the worker*.

37. In his report, Dr. Singer notes that, in his regressions, his measure of Zuffa's foreclosure of the fighter market has a negative and statistically significant effect on fighter share. He states, "This result confirms that Zuffa's foreclosure of the Relevant Input Market and Submarket suppressed compensation for the Bout Class: But for the Challenged Conduct, Zuffa Fighter Shares would have been significantly higher."<sup>15</sup> Logically, the two parts of this statement do not go together. Even if we accept the second part of his statement – that fighter shares would have been higher absent the challenged conduct, that does not imply the first part – that Zuffa's foreclosure of the relevant market suppressed compensation. For example, if the acquisitions that increased Singer's measures of foreclosure led to increased operational efficiencies or compelling match-ups that increased consumer demand, then revenue will go up and fighter share will go down without suppressing the compensation of fighters.

38. In his report, Dr. Singer also states, "As explained below, additional evidence that the Challenged Conduct suppressed Fighter compensation below competitive levels includes: (1) evidence that Zuffa has reduced the share of revenue paid to Fighters over time (as the degree of foreclosure rose); (2) evidence that Zuffa pays a significantly lower share of its revenues than Strikeforce (before the acquisition) or Bellator; and (3) a natural experiment in which Zuffa unilaterally restricted compensation of its Fighters by imposing a new sponsorship tax."<sup>16</sup>

39. Regarding the first of these three claims (that he presents evidence that Zuffa reduced the fighter share), his regressions are consistent with the claim that fighter share is negatively related to Dr. Singer's defined foreclosure measures. It has not been part of my assignment to review Dr. Singer's foreclosure measures. Even if his definition of foreclosure is valid, that does not in any way lead to a conclusion that Zuffa suppressed the pay of fighters as there is no reason to think that labor costs should be a fixed percentage of revenue as Zuffa and the MMA market grow. The change in fighter share could go in either direction as the business and the industry scale up and there is no reason to think that, as Singer suggests in his "but for" world, the fighter share should remain constant.

40. On the second of these claims (that Zuffa pays a lower share of its revenues than other MMA brands), that is not evidence of underpayment. Zuffa is a large entity and has a different cost structure than these other players. There is no basis to expect that

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<sup>15</sup> Ibid.

<sup>16</sup> *Id.* at 126

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fighter shares would be similar at these companies. Zuffa's fighter compensation appears to have been much higher than these other brands (and there is absolutely no evidence to suggest that it was lower), so it is hard to argue that Zuffa underpaid its fighters relative to these alternatives.<sup>17</sup>

41. On the final claim (that the sponsorship tax restricted fighter pay), Dr. Singer presents no evidence that any reduced sponsor money is tied to alleged anticompetitive conduct. He also does not validate the idea that sponsorship tax hurt fighter pay. Zuffa, as I understand it, did change the rules regarding sponsorship. It is in the best interests of Zuffa and its fighters to act in concert when negotiating with sponsors. Sponsorship arrangements are centralized in many sports, including those that Professor Zimbalist uses for reference in his report. Limiting the ability to create individual sponsorship arrangements could well increase the overall sponsorship revenues for MMA fighters as a group. Dr. Singer's claim contains an implicit assumption that Zuffa is able to take the sponsorship dollars that fighters otherwise would have collected and keep that money for Zuffa instead. He provides no evidence that this is the case.

42. Dr. Singer also states in his report that, "Zuffa could not profitably control the share of revenue going to Fighters unless it wielded monopsony power."<sup>18</sup> That is not a meaningful or correct statement. Many businesses operate in competitive labor markets while profitably managing their labor costs. There is no reason to think that Zuffa could not do that and there is no evidence to refute a counter-claim that "Zuffa profitably managed its labor costs in a competitive market for fighters."

**D. Dr. Singer's Focus on "Fighter Share" is Inconsistent with a Recent High-profile Labor Antitrust Plaintiff Claim**

43. Dr. Singer has chosen to use "labor share" or fighter share as the key variable in his report despite that this is not a standard measure used by labor economists when studying employers exerting market power. In addition, this is not a standard measure used by plaintiffs making damages claims in labor market antitrust cases. In the recent highly publicized case of high tech workers suing Apple, Google, and other companies for their "no poaching" agreement, the plaintiff's expert, Professor Edward Leamer, derived his estimates of damages using a standard Mincer Regression. The available version of Professor Leamer's expert report is very heavily redacted so that I cannot quote or cite the exact form of the regressions he runs. However, his report notes that, "These types of regressions can be found in many academic studies of wage structure.

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<sup>17</sup> I inferred that Zuffa fighters make more than other fighters from the Zuffa document that says Zuffa had the "ability to pay fighters the most in the market, by far" (WME-ZUFFA-00013978, quoted from Singer Report at 105) and that Singer concludes that "other MMA promoters could not offer equivalent or viable competitive alternatives to Zuffa" (Singer Report at 51).

<sup>18</sup> *Id.* at 127.

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See e.g. [Mazes-Filho, et al].”<sup>19</sup> The Mazes-Filho paper he refers to uses standard Mincer regressions where the dependent variable is log of pay.<sup>20</sup>

44. In his supplemental report, Leamer says, “I report below estimated multiple regression models that explain the year-by-year increases in average compensation.”<sup>21</sup> The regressions themselves are redacted so I don’t know if the dependent variable is in logs, but this explanation suggests they look at the *amount* of pay, *not* pay as a *share* of the firms’ revenue.

45. In a 2015 published paper (which I believe is his only published paper that studies labor markets), Dr. Singer and a co-author analyzed the high tech anti-poaching case. They note that the plaintiff’s expert (Dr. Leamer), “sought to explain variation in real annual employee compensation (the dependent variable), with variation in the alleged anticompetitive conduct.”<sup>22</sup> The authors note that one of the control variables (that is, one of the independent explanatory variables) in the regression was “employer revenue.”<sup>23</sup> So Dr. Singer holds up as an example of appropriate analysis a regression that uses employee compensation (log of compensation, I believe) as the dependent variable and employer revenue as a control variable rather than as the denominator of the dependent variable. But, when running the regressions in the current case, Dr. Singer chose to ignore this and to run the regressions with fighter share (rather than log of fighter pay) as the dependent variable.

#### **E. Summary**

46. In summary, Dr. Hal Singer’s expert report misrepresents the labor economics literature and his empirical analysis uses a dependent variable that labor economists would not recognize as appropriate for this type of analysis. As a result, the damage estimates he provides have no basis in economic theory or economic analysis. They are unfounded and unreliable.

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<sup>19</sup> “Expert Report of Edward E. Leamer, PH.D.” filed in the case of “IN RE: HIGH-TECH EMPLOYEES ANTITRUST LITIGATION”, October 1, 2012 at footnote 170 on page 53.

<sup>20</sup> Naércio Aquino Menezes-Filho, Marc-Andreas Muendler, and Garey Ramey, 2008, “The structure of worker compensation in Brazil, with a comparison to France and the United States”, *Review of Economics and Statistics*, 90, 324-46.

<sup>21</sup> “Supplemental Expert Report of Edward E. Leamer, PH.D.” filed in the case of “IN RE: HIGH-TECH EMPLOYEES ANTITRUST LITIGATION”, May 10, 2013 at 2.

<sup>22</sup> Kevin Caves and Hal Singer, 2015, “Analyzing High-Tech Employee: The Dos and Don’ts of Proving (and Disproving) Classwide Antitrust Impact in Wage Suppression Cases,” *Antitrust Source*, 14, at 4.

<sup>23</sup> *Ibid.*

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**VI. Alternative Analyses of Dr. Singer's Data Do Not Support His Conclusions**

47. Dr. Singer's primary regression model is specified in equation 1.1 of his report and the results of this regression, with three different proxies for UFC's foreclosure of the labor market for fighters, are reported in Table 6 of his report.<sup>24</sup>

48. As I detailed in the prior section, an appropriate regression would use the log of fighter compensation as the dependent variable. So I ran regressions with exactly the same set of explanatory variables as Dr. Singer used in the regressions reported in Table 6 of his report but I substituted the natural logarithm of the fighter's compensation in the bout as the dependent variable. That is, I ran the exact same regressions as Dr. Singer ran except that, instead of using "Fighter Share" (Fighter compensation in the relevant bout divided by Zuffa's event-specific revenue) as the dependent variable, I used the natural logarithm of fighter compensation in the relevant bout.

49. I report the results of these regressions in Table 1.<sup>25</sup> The results of the regressions in Table 1 lead to starkly different conclusions than the conclusions Dr. Singer draws based on his Fighter Share regressions. Specifically, in all three specifications, the coefficient on Foreclosure Share is statistically *insignificant* and very far from significant at conventional levels. In column 1, the coefficient of 0.130 means that our best guess is that an increase in foreclosure share leads to an *increase* in fighter pay. Given that the result is not significantly different from zero, there is no basis on which to claim that foreclosure and pay are positively related. However, this regression (and the ones reported in columns 2 and 3 using alternative measures of Foreclosure Share) allows me to say very confidently that the data Dr. Singer analyzed provides no evidence of a negative relationship between Foreclosure Share and fighter earnings.

50. In other words, had Dr. Singer designed his regressions to be consistent with the methods used by labor economists when they study the effects of monopsony on pay, he would have had no basis for concluding that higher levels of his measures of Zuffa's power in the fighter labor market led to lower pay for UFC fighters. Given that he based his damages estimates on his claim that Zuffa's labor market power lowered Fighter Share, Dr. Singer would have had no basis to claim that there was any financial injury or damage whatsoever to fighters from Zuffa's control of the labor market if he had run his regressions properly. Regressions consistent with established methods reject the proposition that all or virtually all class members were injured by the alleged conduct.

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<sup>24</sup> Singer Report at 119 and 125.

<sup>25</sup> I report coefficients and p-values of the same variables as Dr. Singer reports.



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**Table 1: Regression Results**

Dependent Variable: Natural Logarithm of Fighter Pay

Data and Explanatory Variables are identical to Table 6 in Dr. Singer's Report

Foreclosure Measure	Tracked	Ranked	Headliner
Foreclosure Share	0.130 (0.303)	-0.0396 (0.800)	0.1234 (0.321)
Gender	-0.265** (0.0482)	-0.272** (0.0409)	-0.265** (0.0479)
Fight Ending Round	0.00759 (0.594)	0.00728 (0.611)	0.00757 (0.595)
Win Flag	0.329*** (0)	0.329*** (0)	0.329*** (0)
HasRank	0.0780** (0.0204)	0.0777** (0.0211)	0.0781** (0.0202)
Current Rank	-0.00064*** (6.09e-06)	-0.00065*** (4.99e-06)	-0.00065*** (5.94e-06)
LOA	0.372*** (1.25e-05)	0.376*** (9.13e-06)	0.372*** (1.25e-05)
PPV	0.776*** (7.61e-11)	0.775*** (7.65e-11)	0.776*** (7.62e-11)
Wins	0.178*** (0)	0.179*** (0)	0.178*** (0)
Fights	0.00649 (0.780)	0.0111 (0.629)	0.00658 (0.776)
Fight Of The Night	0.760*** (0)	0.760*** (0)	0.760*** (0)
Fighter KO Of The Night	0.560*** (0)	0.561*** (0)	0.560*** (0)
Fighter Submission Of The Night	0.685*** (0)	0.685*** (0)	0.685*** (0)
Fighter Performance Of The Night	0.523*** (0)	0.523*** (0)	0.523*** (0)
Win Method: Could Not Continue	-0.0166 (0.833)	-0.0180 (0.818)	-0.0168 (0.831)
Win Method: Disqualification	-0.237** (0.0311)	-0.238** (0.0307)	-0.238** (0.0308)
Win Method: Decision Major	-0.0831 (0.271)	-0.0799 (0.291)	-0.0830 (0.271)
Win Method: Dec Split	-0.112** (0.0295)	-0.110** (0.0327)	-0.112** (0.0296)
Win Method: Dec Unanimous	-0.108** (0.0321)	-0.107** (0.0344)	-0.108** (0.0322)

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Win Method: Knockout/ TKO	-0.00512 (0.914)	-0.00528 (0.911)	-0.00508 (0.914)
Win Method: Overturned	0.0627 (0.392)	0.0687 (0.350)	0.0629 (0.390)
Win Method: Submission	-0.0190 (0.693)	-0.0178 (0.713)	-0.0190 (0.694)
Total Knockdowns	0.00538 (0.657)	0.00451 (0.711)	0.00535 (0.659)
Strikes Landed	0.00162 (0.428)	0.00167 (0.412)	0.00162 (0.429)
Strikes Attempted	-0.00151 (0.394)	-0.00157 (0.376)	-0.00151 (0.394)
Percent of Strikes Landed	0.0390 (0.604)	0.0400 (0.596)	0.0389 (0.605)
Significant Strikes Landed	-0.00141 (0.514)	-0.00145 (0.501)	-0.00140 (0.516)
Significant Strikes Attempted	0.00193 (0.281)	0.00198 (0.268)	0.00192 (0.282)
Percent of Sig Strikes Landed	0.0385 (0.613)	0.0378 (0.621)	0.0387 (0.612)
Takedowns Landed	0.00163 (0.784)	0.00171 (0.773)	0.00164 (0.783)
Takedowns Attempted	-0.00105 (0.669)	-0.00104 (0.671)	-0.00105 (0.670)
Percent of Takedowns Landed	0.00940 (0.621)	0.00877 (0.644)	0.00935 (0.623)
Submissions Attempted	0.00789 (0.196)	0.00772 (0.204)	0.00788 (0.196)
Offensive Passes	0.00162 (0.625)	0.00172 (0.604)	0.00163 (0.623)
Sweeps (Reversals)	-0.00468 (0.748)	-0.00532 (0.715)	-0.00468 (0.748)
Trend	0.154* (0.0685)	0.177** (0.0456)	0.155* (0.0671)
Constant	5.593*** (0.000119)	5.259*** (0.000510)	5.595*** (0.000118)
Fighter Fixed Effects	Yes	Yes	Yes
Observations	7,154	7,154	7,154
R-squared	.928	.928	.928
Number of Fighters	1,396	1,396	1,396

Robust pval in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1



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51. While the main focus of these regressions is the Foreclosure Share, further weakness in Dr. Singer's empirical approach can be found by looking at results for some of the control variables. Doing so further reinforces the idea that log pay regressions are more sensible and intuitive than Dr. Singer's Fighter Share regressions. Consider, as just one example, the effect of the "Win Flag" variable. This variable takes the value of one if the fighter wins and takes the value of zero otherwise. Dr. Singer explains that in the vast majority of fights, a "win purse" is given to the bout winner and this purse is typically equal to (and added on top of) the pay the fighter receives for participating.<sup>26</sup>

52. In his regression results, there is *no relationship* between Fighter Share and the Win Flag variable. This means that, if asked to interpret his regression results as they relate to Win Flag, Dr. Singer would have to say that winning a bout has no effect on the fighter's pay (because he treats Fighter Share and fighter pay as essentially synonymous). That conclusion is in direct conflict with Dr. Singer's own explanation of win purses. In Table 1, I show that, when specified correctly with natural logarithm of pay as the dependent variable, the Win Flag variable has a regression coefficient of approximately 0.33 which is highly statistically significant. This indicates that, all else equal, winning a fight increases a fighter's earnings by approximately 39%.<sup>27</sup> Given that a typical win purse is equal to the show purse and that the compensation measure includes the sum of win purse, show purse, discretionary pay, PPV royalties, and letters of agreement,<sup>28</sup> this relationship between Win Flag and the log of fighter pay makes intuitive sense. In contrast, the relationship between Win Flag and Fighter Share in Dr. Singer's regressions is counterintuitive and further evidence that he uses an inappropriate specification that does not properly capture how relevant factors affect fighter compensation.

53. Overall, based on close inspection of the results of Dr. Singer's empirical analysis and my corrections to Dr. Singer's empirical analysis, it is my opinion that Dr. Singer has drawn inappropriate conclusions. I see *no* empirical evidence that there is a relationship between Zuffa's foreclosure share and fighter earnings.

## **VII. Professor Zimbalist Also Focuses on an Inappropriate Earnings Measure and Makes Invalid Comparisons**

54. Professor Zimbalist provides an expert report in which all of his estimates of damages are based on the share of revenue earned by UFC fighters relative to athletes in other sports. For reasons I have already laid out in this report, the fighter's share of revenue is not an appropriate measure of fighter earnings and conclusions based on this measure are invalid.

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<sup>26</sup> Singer Report at 22.

<sup>27</sup> This is because a 0.33 unit increase in the log of compensation is associated with an increase in compensation of  $e^{0.33}$  (that is, the exponential function of 0.33) which is 1.39. Because this is 39% greater than one, the regression indicates that a one unit increase in "Win Flag" (that is, if the fighter wins relative to if he or she loses) leads to an average of a 39% increase in fighter pay.

<sup>28</sup> Singer Report at 119.

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55. There are other issues with Professor Zimbalist's report that further call into question any conclusions he reaches. For example, in Tables 4 and 5 on page 81 of his report, Professor Zimbalist shows two trends related to fighter earnings over time. First, note that both Dr. Singer and Professor Zimbalist argue throughout their reports that Zuffa's foreclosure was going up over time.<sup>29</sup> But Tables 4 and 5 show that fighter's share of revenue was going up over the years suggesting that Zuffa's foreclosure of the fighter market does not lead to lower fighter share.

56. Professor Zimbalist goes on to compare earnings of MMA fighters to athletes that compete in boxing, baseball, football, hockey, and basketball. Even if I accepted that share of revenues was somehow a relevant measure within MMA (and, as I have described at length, I do not accept that), there is absolutely no reason to think the athlete's share of revenue should be compared to other sports or would be comparable across sports, particularly those that have been established for many years. Nascent businesses often face different cost and revenue structures that would affect any comparison of a worker's percentage of revenue share in comparison to established businesses. Professor Zimbalist does not explain why a comparison limited to sports or across sports is appropriate at all nor why he limits his comparisons to large, established sports. It might be more appropriate to compare MMA to up-and-coming sports like the X-Games, though that comparison would not justify claims of damages to Zuffa athletes given that news reports suggest X-Games athletes earn just a few percent of the revenue the event brings in.<sup>30</sup>

57. Another important factor that could affect the share of revenues captured by athletes is the substitutability of marginal athletes for top athletes. Suppose that there is enough demand for 1,000 bouts in a year and that 225 fighters participate (which is similar to the year 2014 which was the peak number of UFC bouts). If there are 500 fighters that are all fairly close in skill and who fans would be equally interested in watching, then the marginal product of a UFC fighter (at least those that are not big stars) would be quite low because each fighter could be easily replaced with little lost value. Thus, to really compare across sports as Professor Zimbalist does, one would have to know the distribution of talent relative to fan demand and willingness-to-pay. Without that information, it makes no sense to compare labor share across sports under the assumption that the share should be the same.

58. Another factor that can explain the difference across sports in the share paid to athletes is simply the scale of revenues. As a much smaller revenue sport, MMA may be subject to much higher administrative costs as a percentage of revenue. All the sports that Professor Zimbalist uses as comparisons to MMA are on the order of ten or more times as large in terms of dollar revenue. UFC revenues, according to Professor Zimbalist, were \$666 Million in 2016 while the NFL's revenue was over \$13 *Billion*.<sup>31</sup> It is hard to compare boxing to MMA given that a recent boxing fight (Mayweather vs.

<sup>29</sup> See, for example, Figure 1 of Singer Report at 88.

<sup>30</sup> Monte Burke, 2004, "X-treme Economics", Forbes.com.

<sup>31</sup> Jason Belzer, 2016, "Thanks To Roger Goodell, NFL Revenues Projected to Surpass \$13 Billion In 2016", Forbes.com.

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Pacquiao in 2015) brought in more revenue in one fight than UFC generated in that whole year.<sup>32</sup> These businesses are at such different scale that it makes no sense to compare their cost structures on a line-by-line basis.

59. In summary, Professor Zimbalist's comparisons to other sports are inappropriate because the focus on labor share is not based on standard economic principles and because the sports he has chosen for comparison are not similar to MMA.

**VIII. Summary and Conclusions**

60. It is my opinion that the expert reports provided by Dr. Hal Singer and Professor Andrew Zimbalist provide no reliable evidence whatsoever that Zuffa's business practices caused any financial loss to the athletes that fought in bouts promoted by Zuffa.

61. Both expert reports focus on Zuffa fighters' share of total Zuffa revenue as the basis of their damages estimates. There is no basis in economic principle for this and it is inconsistent with the way labor economists study monopsony power and labor markets more generally.

62. Dr. Singer's regressions are specified in a manner that is inconsistent with modern empirical work in labor economics. When his analysis is done using standard methods, there is absolutely no evidence of financial damages to Zuffa fighters from Zuffa's high market share in MMA.

63. Professor Zimbalist's comparisons to other sports are ad hoc and inappropriate. There are several possible reasons that the athletes' share of revenues would vary widely from sport to sport that have nothing to do with competitiveness in the labor market.

A handwritten signature in black ink, appearing to read "Paul Oyer", is written over a horizontal line.

Paul Oyer  
Executed on October 27, 2017

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<sup>32</sup> Kurt Badenhausen, 2015, "Mayweather And Pacquiao Produce the First \$600 Million Night In The History Of Sports", Forbes.com.

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**EXHIBIT A: CURRICULUM VITAE**

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Education:

Princeton University, Ph.D., Economics, 1996  
Princeton University, M.A., Economics, 1994  
Yale University, School of Management, M.B.A., 1989  
Middlebury College, B.A., Mathematics and Computer Science, *magna cum laude*, Phi Beta Kappa, with High Honors, 1985

Current Positions:

Fred H. Merrill Professor of Economics, Graduate School of Business, Stanford University, Stanford, CA, April 2011 – .  
Research Associate, National Bureau of Economic Research, September 2003 – .  
Editor-in-Chief, *Journal of Labor Economics*, November 2012 – .  
Senior Fellow, Stanford Institute for Policy Research, October 2015 – .  
Research Fellow, IZA, March 2016 – .  
Faculty Co-Director, Center for Entrepreneurial Studies, Stanford University Graduate School of Business, September 2016 – .

Past Academic Positions:

Dhirubhai Ambani Faculty Fellow in Entrepreneurship, 2016 – 2017.  
Joseph and Laurie Lacob Faculty Fellow, 2013-2014.  
Editor, *Journal of Labor Economics*, 2007-2012  
Louise and Claude N. Rosenberg, Jr. Faculty Scholar, September 2008 – August 2009.  
Professor of Economics, Graduate School of Business, Stanford University, Stanford, CA, September 2009 – April 2011.  
Associate Professor of Economics, Graduate School of Business, Stanford University, Stanford, CA, September 2002 – 2009.  
Assistant Professor of Economics, Graduate School of Business, Stanford University, Stanford, CA, July 2000 – August 2002.  
Assistant Professor of Management and Strategy, J.L. Kellogg Graduate School of Management, Northwestern University, Evanston, IL, August 1996 – July 2000.

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Morgridge Faculty Fellow in Entrepreneurship, Graduate School of Business,  
Stanford University, Stanford, CA, August 2000 – July 2001.  
Faculty Research Fellow, Institute for Policy Research, Northwestern University,  
Evanston, IL, September 1998 – July 2000.  
Affiliate, Center for the Study of Industrial Organization, Northwestern  
University, Evanston, IL, February 2000- July 2000.

Teaching:

“Business and Public Policy Perspectives on U.S. Inequality” – MBA Elective  
“Strategies for Growth” – MBA Elective  
“Strategic Leadership” – MBA Core Class  
“Microeconomics” – MBA and Sloan Program Core Class  
“Human Resource Management” – MBA Core Class  
“Critical Analytical Thinking” – MBA Core Class  
“Empirical Investigations in Human Resource Management” – MBA Elective  
“Field Research in Human Resources” – MBA Elective  
“Hiring and Selection” – MBA Elective  
“Personnel Economics” – PhD Course  
“Incentives and Productivity” – MBA Elective  
“Strategy and Organization” – MBA Elective  
“Empirical Issues in Business Strategy” – PhD Course  
Delivered “Sloan Distinguished Faculty Lecture”, Stanford GSB Reunions,  
October 2004

Books:

*The Rational Sports Fan* (with David Oyer), Yale University Press (under contract).  
*Everything I Ever Needed to Know About Economics I Learned from Online Dating*, Harvard Business Review Press, 2014.  
• Silver Medalist, 2014 Axiom Business Book Awards.  
*Roadside MBA: Backroad Lessons for Entrepreneurs, Executives and Small Business Owners* (with Michael Mazzeo and Scott Schaefer), Business Plus, 2014.

Academic Publications:

“Exploration for Human Capital: Theory and Evidence from the MBA Labor Market,” (with Camelia M. Kuhnen), *Journal of Labor Economics*, 34, April 2016, 255-286.  
“Firm/Employee Matching: An Industry Study of American Lawyers” (with Scott Schaefer), *Industrial and Labor Relations Review*, 69, March 2016, 378-404.  
“Personnel Economics” (with Edward P. Lazear), In: Robert Gibbons and D. John Roberts, *The Handbook of Organizational Economics*, Princeton University Press, 2013, pp. 479-519.

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- “Personnel Economics: Hiring and Incentives” (with Scott Schaefer), In: Orley Ashenfelter and David Card, editors: *Handbook of Labor Economics*, Vol 4b, Great Britain, North Holland, 2011, pp. 1769-1823.
- “The Making of an Investment Banker: Macroeconomic Shocks, Career Choice, and Lifetime Income”, *Journal of Finance*, 63, December 2008, 2601-2628. (Brattle Group Prize, Distinguished Paper, for outstanding paper on corporate finance in *Journal of Finance*.)
- “Salary or Benefits?”, *Research in Labor Economics*, 28, 2008, 429-467.
- “Ability and Employer Learning: Evidence from the Economist Labor Market”, *Journal of the Japanese and International Economies* (special issue on “Organizational Innovation and Firm Performance”), 22, June 2008, 268-289.
- “Wage Structure and Labor Mobility in Sweden, 1970-1990”, in *The Structure of Wages: An International Comparison*, edited by Edward P. Lazear and Kathryn Shaw, University of Chicago Press, 2008, 419-447.
- “Is There an Insider Advantage in Getting Tenure?”, *American Economic Review Papers and Proceedings*, 97, May 2007, 501-505.
- “Initial Labor Market Conditions and Long-Term Labor Market Outcomes for Economists”, *Journal of Economic Perspectives*, 20, Summer 2006, 143-160.
- “Mandated Disclosure, Stock Returns, and the 1964 Securities Acts Amendments” (with Michael Greenstone and Annette Vissing-Jorgensen), *Quarterly Journal of Economics*, 121, May 2006, 399-460.
- “Co-Worker Complementarity and the Stability of Top Management Teams” (with Rachel M. Hayes and Scott Schaefer), *Journal of Law, Economics, and Organizations*, 22, Spring 2006, 184-212.
- “Costs of Broad-Based Stock Option Plans” (with Scott Schaefer), *Journal of Financial Intermediation*, 15, October 2006, 511-534.
- “Why Do Some Firms Give Stock Options To All Employees?: An Empirical Examination of Alternative Theories” (with Scott Schaefer), *Journal of Financial Economics*, 76, April 2005, 99-133.
- “Internal and External Labor Markets: A Personnel Economics Approach” (with Edward P. Lazear), *Labour Economics*, 11, October 2004, 527-554.
- “Why Do Firms Use Incentives That Have No Incentive Effects?”, *Journal of Finance*, 59, August 2004, 1619-1649. (Nominated for the Brattle Prize for outstanding paper on corporate finance in *Journal of Finance*.)
- “The Structure of Wages and Internal Mobility” (with Edward P. Lazear), *American Economic Review Papers and Proceedings*, 94, May 2004, 212-216.
- “Recall Bias Among Displaced Workers”, *Economics Letters*, 82, March 2004, 392-397.
- “Litigation Costs and Returns to Experience” (with Scott Schaefer), *American Economic Review*, 92, June 2002, 683-705.
- “Sorting, Quotas, and the Civil Rights Act of 1991: Who Hires When It's Hard to Fire?” (with Scott Schaefer), *The Journal of Law and Economics*, 65, April 2002, 41-68. (Reprinted in Italian as “Selezione, Quote e il Civil



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- Rights Act Del 1991: Chi Assume Quando e Difficile Licenziere?”, *Revista Italiana Di Diritto Del Lavoro*, 22, 2003, 137-165.)
- “Layoffs and Litigation” (with Scott Schaefer), *RAND Journal of Economics*, 31, Summer 2000, 345-358.
- “A Theory of Sales Quotas with Limited Liability and Rent Sharing”, *Journal of Labor Economics*, 18, July 2000, 405-426.
- “Are There Sectoral Anomolies Too? The Pitfalls of Unreported Multiple Hypothesis Testing and a Simple Solution” (with Michael Greenstone), *Review of Quantitative Finance and Accounting*, 15, July 2000, 37-55.
- “The Timeliness of Performance Information in Determining Executive Compensation” (with Kevin Hallock), *Journal of Corporate Finance*, 5, November 1999, 303-321.
- “Fiscal Year Ends and Non-Linear Incentive Contracts: The Effect on Business Seasonality”, *Quarterly Journal of Economics*, 113, February 1998, 149-185.

Other Publications:

- “The Independent Workforce in America: The Economics of an Increasingly Flexible Labor Market”, Upwork White Paper, November, 2016.
- “Some Thoughts on the ‘Gathering Storm’, National Security, and the Global Market for Scientific Talent”, in *Perspectives on U.S. Competitiveness in S&T and National Security*, edited by Titus Galama and James Hosek, Washington, DC: RAND Corporation, forthcoming.
- “The Value of Knowing” (with Michael Greenstone and Annette Vissing-Jorgensen), *Regulation*, Summer 2006, 52-61.
- “The Impact of Mandatory Disclosure Laws on Public Companies: New Evidence from OTC Firms” (with Michael Greenstone and Annette Vissing-Jorgensen), Stanford Institute for Economic Policy Research Policy Brief, January 2006.
- “The Bias Backfire” (with Scott Schaefer), *Harvard Business Review*, November 2004, 26.
- “The Unintended Consequences of the ‘91 Civil Rights Act” (with Scott Schaefer), *Regulation*, Summer 2003, 42-47.
- “Stock Options – It’s Not Just About Motivation”, Stanford Institute for Economic Policy Research Policy Brief, October 2002.
- “The ‘Dos’ and ‘Don’ts’ of Options Grants”, *Strategy and Business*, Q4, 2002.
- Review of *Internal Labour Markets in Japan* by Kenn Ariga, Giorgio Brunello, and Yasushi Ohkusa, *Industrial and Labor Relations Review*, 54, July 2001, 895-896.

Working Papers:

- “The Gender Gap in the Gig Economy: Evidence from a Million Uber Drivers” (with Cody Cook, Rebecca Diamond, Jonathan Hall, and John List), October, 2017
- “Dinner Table Human Capital and Entrepreneurial Outcomes” (with Hans Hvide), October, 2017

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- “What Do MBAs Know? When Do They Know It?” (with Monica Bhole), April, 2016
- “Welcome to the Club: The Returns to an Elite Degree for American Lawyers” (with Scott Schaefer), April, 2016
- “American BigLaw Lawyers and the Schools that Produce Them: A Profile and Rankings” (with Scott Schaefer), January, 2011
- “Managerial Incentives and Value Creation: Evidence from Private Equity” (with Phillip Leslie), August, 2013
- “Talent Sorting and Skill Complementarity Among Software Engineers” (with Frederick Andersson, Matthew Freedman, John Haltiwanger, and Kathryn Shaw), December, 2006
- “Who Benefits from Tax-Advantaged Employee Benefits?: Evidence from Parking” (with Michael Grubb), September, 2009
- “Can Employee Benefits Ease the Effects of Nominal Wage Rigidity?: Evidence from Labor Negotiations”, August, 2005
- “Discretion in Executive Incentive Contracts: Theory and Evidence” (with Kevin J. Murphy), June, 2003
- “Downsizing and Corporate Restructuring: A Case Study”, December, 2002

Work in Progress:

- “Gender and the Value of Flexibility” (with Cody Cook, Rebecca Diamond, Jonathan Hall, and John List)
- “Structured Hiring” (with Vivienne Groves and Scott Schaefer)
- “What Drives Turnover and Layoffs at Large Law Firms?” (with Scott Schaefer)

Fellowships and Grants:

- “The Effects of Regulation: Evidence from the Securities Acts Amendments of 1964” (with Michael Greenstone and Annette Vissing-Jorgensen), funded by the Stigler Center at the University of Chicago and the John M. Olin Program in Law and Economics at Stanford Law School.
- “Employer Responses to Displacement Costs and Wrongful Termination Litigation” (with Scott Schaefer), funded by the Searle Fund.
- “Downsizing: A Look at Those Who Stay and Those Who Go”, Citigroup Behavioral Sciences Research Council project.
- “Determinants of Non-CEO Managerial Turnover” (with Rachel M. Hayes and Scott Schaefer), funded by the GM Strategy Center and the American Compensation Association's Emerging Scholar's Program.
- “Facing an Aging Workforce: A Test of the Effects of Mandatory Retirement” (with Orley Ashenfelter), Citigroup Behavioral Sciences Research Council project.
- Alfred P. Sloan Foundation Dissertation Fellowship, September 1995 - June 1996
- Princeton University Industrial Relations Section Fellowship, September 1992 - May 1996

Recent and Scheduled Presentations:

- 2017: UC Berkeley, University of Illinois



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2016: NBER Summer Institute, Chinese University of Hong Kong, Tuck FOM Conference, Kellogg School

2015: Harvard Business School

2014: London Business School, London School of Economics, University of Minnesota, USC Marshall School, IZA

2013: Yale Law School, University of Oregon, MIT Sloan School, Columbia Business School

Keynote Addresses:

New Zealand Government Economics Network Conference, Wellington, New Zealand, 2014.

Middle Market Forum, Palo Alto, 2016.

Staffing Industry Analysts Collaboration in the Gig Economy Conference, Dallas, 2017.

Other Professional Activity:

Awarded Key to the City of Dothan, Alabama, 2014.

Referee for *American Economic Review*, *British Journal of Industrial Relations*, *Economic Inquiry*, *Economic Journal*, *Economics Bulletin*, *Economics Letters*, *Econometrica*, *Economica*, *Educational Evaluation and Policy Analysis*, *Industrial and Labor Relations Review*, *Industrial Relations*, *International Journal of Industrial Organization*, *Japanese Economic Review*, *Journal of Accounting and Economics*, *Journal of Business*, *Journal of Comparative Economics*, *Journal of Corporate Finance*, *Journal of Economic Behavior and Organizations*, *Journal of Economic Literature*, *Journal of Economics and Management Strategy*, *Journal of Finance*, *Journal of Financial Economics*, *Journal of Industrial Economics*, *Journal of Labor Economics*, *Journal of Law, Economics, and Organization*, *Journal of Institutional and Theoretical Economics*, *Journal of Political Economy*, *Labour Economics*, *Management Science*, *Managerial and Decision Economics*, National Science Foundation, *Quarterly Journal of Economics*, *RAND Journal of Economics*, *Review of Accounting Studies*, *Review of Economics and Statistics*, *Review of Economic Studies*, *Review of Financial Studies*, and *Sociological Focus*.

Served on 2009 Science of Science and Innovation Panel, National Science Foundation.

Area Coordinator, Economics Group, Stanford Graduate School of Business, September 2009 - .

Co-Organizer, NBER Conference on “The Economics of High-Skill Labor Markets”, December 2007

Co-Organizer, Stanford Institute for Theoretical Economics (SITE) Workshop on “Personnel Economics”, June 2002

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Program Committee for 2004 Olin School Conference on Corporate Governance and 2006-2011 Utah Winter Business Economics Conference

Discussant at American Compensation Association Academic Conferences (1998, 2000), Econometric Society Winter Meetings (2000, 2004), EALE/SOLE World Congress (2000), American Economic Association Meetings (2002, 2005, 2007, 2008, 2010, 2013), Stanford Strategy Conference (2003), Society of Labor Economists Meetings (2003, 2006, 2007), American Finance Association Meetings (2004, 2009), NBER Summer Institute (2005, 2006, 2009, 2011, 2015), Conference on Empirical Legal Studies (2007, 2012), Incentives and Risk Taking Workshop (2012), NBER Immigration Conference (2012), NBER Great Recession Conference (2013), the Haas-Sloan Conference on the Law and Economics of Organization (2012), and NBER Conference on Firms and Inequality (2015).

Member of Steering Committee for Stanford University K-12 Initiative, Center for Education Policy Analysis, and Center on the Legal Profession.

Other Experience:

Market Analyst, ASK Computer Systems, Mountain View, CA, 1991 - 1992

Product Manager, 3Com Corporation, Santa Clara, CA, 1990 - 1991

Production Planner, 3Com Corporation, Santa Clara, CA, 1989 - 1990

Research Associate, Booz Allen and Hamilton, Inc., New York, NY, 1985 - 1987

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**EXHIBIT B: MATERIALS RELIED UPON**

## Court Documents

- Expert Report of Hal J. Singer, as well as accompanying data and programs
- Expert Report of Andrew Zimbalist
- Deposition of Hal J. Singer
- Deposition of Andrew Zimbalist
- ZFL-0000003 (Zuffa Fighter compensation table)
- “Expert Report of Edward E. Leamer, PH.D.” filed in the case of “IN RE: HIGH-TECH EMPLOYEES ANTITRUST LITIGATION”, October 1, 2012
- “Supplemental Expert Report of Edward E. Leamer, PH.D.” filed in the case of “IN RE: HIGH-TECH EMPLOYEES ANTITRUST LITIGATION”, May 10, 2013

## Academic Publications

- David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen, “The Fall of the Labor Share and the Rise of Superstar Firms,” working paper, May 1, 2017, downloaded from <https://economics.mit.edu/files/12979>.
- William M. Boal and Michael R. Ransom, 1997, “Monopsony in the Labor Market,” *Journal of Economic Literature*, 35, 86-112.
- Kevin Caves and Hal Singer, 2015, “Analyzing High-Tech Employee: The Dos and Don’ts of Proving (and Disproving) Classwide Antitrust Impact in Wage Suppression Cases,” *Antitrust Source*, 14.
- Barry T. Hirsch and Edward J. Schumacher, 1995, “Monopsony Power and Relative Wages in the Labor Market for Nurses,” *Journal of Health Economics*, 14, 443-476.
- Barry T. Hirsch and Edward J. Schumacher, 2005, “Classic or New Monopsony? Searching for Evidence in Nursing Labor Markets,” *Journal of Health Economics*, 24, 969-989.
- Loukas Karabarbounis and Brent Neiman, 2014, “The Global Decline of the Labor Share,” *The Quarterly Journal of Economics*, 129, 61–103.
- Michael Katz and Harvey Rosen, 1998, *Microeconomics* (third edition), 264-265 and 276-277.
- Morris Kleiner and Kyoung Won Park, 2010, Battles Among Licensed Occupations: Analyzing Government Regulations on Labor Market Outcomes for Dentists and Hygienists, NBER Working Paper #16,560.
- Alan Manning, 2003, *Monopsony in Motion*, Princeton University Press.
- Alan Manning, 2011, “Imperfect Competition in the Labor Market,” in *The Handbook of Labor Economics*, Volume 4b, edited by Orley Ashenfelter and David Card, New York, Elsevier.
- Naércio Aquino Menezes-Filho, Marc-Andreas Muendler, and Garey Ramey, 2008, “The structure of worker compensation in Brazil, with a comparison to France and the United States”, *Review of Economics and Statistics*, 90, 324-46.

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